

## CLAIMS

What is claimed is:

1. An apparatus for simultaneously thinning the backside surfaces of a plurality of wafers comprised of a semiconductor material, comprising:

a fixture having a plurality of horizontally oriented receptacles for loading the plurality of semiconductor wafers therein; and

an etchant solution capable of isotropically removing a layer of semiconductor material from the backside surface of the plurality of semiconductor wafers;

wherein when the loaded fixture is immersed into the etchant solution for a sufficient period of time a layer of semiconductor material is removed from the backside surface of the plurality of semiconductor wafers to form a plurality of thinned semiconductor wafers.

2. The apparatus according to claim 1, wherein the etchant solution is comprised of a mixture of acetic acid, hydrogen bromide, potassium dichromate, and water.

3. The apparatus according to claim 2, wherein the etchant solution is comprised of a mixture having a volume ratio of about 4.5 parts water:3 parts hydrobromic acid:1 part acetic acid and 77.6 g potassium dichromate per 1000 ml of solution.

4. The apparatus according to claim 1, further comprising a rotation apparatus for rotating the fixture.

5. The apparatus according to claim 1, further comprising a circulation apparatus for circulating the etchant solution.
6. The apparatus according to claim 1, further comprising a temperature adjustment apparatus for adjusting the temperature of the etchant solution.
7. The apparatus according to claim 1, wherein the etchant solution is maintained at a temperature in the range of about 40°C. to about 50°C.
8. The apparatus according to claim 1, wherein the semiconductor material includes indium phosphide.
9. The apparatus according to claim 1, wherein the thinned semiconductor wafers are incorporated into devices selected from the group consisting of microwave circuits, millimeter wave circuits, and combinations thereof.

10. The apparatus according to claim 1, wherein the thinned semiconductor wafers have a final thickness in the range of about 25 to about 250  $\mu\text{m}$ .

11. A method for simultaneously thinning the backside surfaces of a plurality of wafers comprised of a semiconductor material, comprising:

providing a fixture having a plurality of horizontally oriented receptacles for receiving the plurality of semiconductor wafers;

loading the plurality of semiconductor wafers into the plurality of receptacles;

providing an etchant solution capable of isotropically removing a layer of semiconductor material from the backside surface of the plurality of semiconductor wafers; and

immersing the loaded fixture into the etchant solution for a sufficient period of time to cause the removal of a layer of semiconductor material from the backside surface of the plurality of semiconductor wafers to form a plurality of thinned semiconductor wafers.

12. The method according to claim 11, wherein the etchant solution is comprised of a mixture of acetic acid, hydrogen bromide, potassium dichromate, and water.

13. The method according to claim 12, wherein the ratio of acetic acid to hydrogen bromide to potassium dichromate to water is about 4.5:1.5:132:1.

14. The method according to claim 11, further comprising a rotation apparatus for rotating the fixture.

15. The method according to claim 11, further comprising a circulation apparatus for circulating the etchant solution.

16. The method according to claim 11, further comprising a temperature adjustment apparatus for adjusting the temperature of the etchant solution.

17. The method according to claim 11, wherein the etchant solution is maintained at a temperature in the range of about 40°C. to about 50°C.

18. The method according to claim 11, wherein the semiconductor material includes indium phosphide.

19. The method according to claim 11, wherein the thinned semiconductor wafers are incorporated into devices selected from the group consisting of microwave circuits, millimeter wave circuits, and combinations thereof.

20. The method according to claim 11, wherein the thinned semiconductor wafers have a final thickness in the range of about 25 to about 250  $\mu\text{m}$ .